

Pizza and Problems

Fall 2009

Assigned on: September 18, 2009

Due on: September 18, 2009

PROBLEM 1 In trapezoid ABCD with based AB and CD, we have $AB = 52$, $BC = 12$, $CD = 39$, and $DA = 5$. Find the area of ABCD.

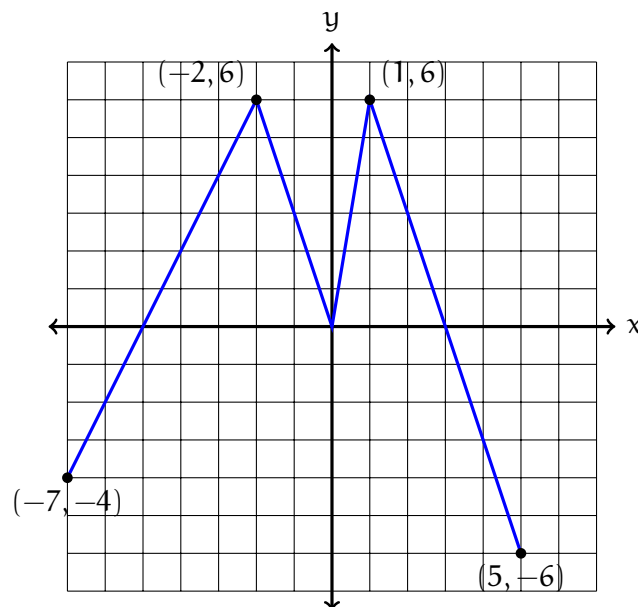
PROBLEM 2 Tina randomly selects two distinct numbers from the set $\{1, 2, 3, 4, 5\}$, and Sergio randomly selects a number from the set $\{1, 2, \dots, 10\}$. What is the probability that Sergio's number is larger than the sum of the two numbers chosen by Tina?

PROBLEM 3 Points A, B, C, and D lie on a line, in that order, with $AB = CD$ and $BC = 12$. Point E is not on the line, and $BE = CE = 10$. The perimeter of $\triangle AED$ is twice the perimeter of $\triangle BEC$. Find AB.

PROBLEM 4 Spot's doghouse has a regular hexagonal base that measures one yard on each side. He is tethered to a vertex with a two-yard rope. What is the area, in square yards, of the region outside of the doghouse that Spot can reach?

PROBLEM 5 A triangle has vertices $(0, 0)$, $(1, 1)$, and $(6m, 0)$, and the line $y = mx$ divides the triangle into two triangles of equal area. What is the sum of all possible values of m ?

PROBLEM 6 The graph of the function f is shown below. How many solutions does the equation $f(f(x)) = 6$ have?



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1

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PROBLEM 7 In triangle $\triangle ABC$, side AC and the perpendicular bisector of BC meet in point D , and BD bisects $\angle ABC$. If $AD = 9$ and $DC = 7$, what is the area of triangle $\triangle ABD$?

PROBLEM 8 Find the number of ordered pairs of real numbers (a, b) such that $(a + bi)^{2002} = a - bi$.

PROBLEM 9 Two different positive numbers a and b each differ from their reciprocals by 1. What is $a + b$?

PROBLEM 10 The polynomial $p(x) = x^3 - 2004x^2 + mx + n$ has integer coefficients and three distinct positive zeros. Exactly one of these is an integer, and it is the sum of the other two. How many values of n are possible?

PROBLEM 11 Let n be a positive integer. Find the number of pairs P, Q of polynomials with real coefficients such that

$$(P(X))^2 + (Q(X))^2 = X^{2n} + 1$$

and $\deg P > \deg Q$.

1 Wiki Page

Our wiki page for Pizza and Problems is located at the following URL:

http://msenux.redwoods.edu/wiki/index.php/Pizza_and_Problems

If interested in editing solutions on this page, you need an account. If you wish an account, post an email to david-arnold@redwoods.edu that includes a username and password which you wish to use to log into the wiki.